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THE STUDY OF STATISTICS IN ITALIAN UNIVERSITIES.

BY CARROLL D. WRIGHT.

At the joint session of the American Economic Association and the American Historical Association at Cambridge, in May, 1887, I had the honor to read a paper on "The Study of Statistics in Colleges." I was fortunate enough to be able to present at that time the programmes of some of the universities in Europe, but I had not been able to secure the line of work carried on in Italian institutions of learning. Through the courtesy of Signor Bodio, of the Department of Agriculture and Commerce at Rome, I have been able to collect information relating to Italy, and feeling that this information ought to be put in permanent form, that our own colleges and universities may have the benefit of it, I have been glad to present it to the American Statistical Association, that it may become a part of its public work.

Not only is the science of statistics taught in the universities of Italy, but it is taught also in every one of the technical institutes of the country, about eighty in number. These institutes correspond to the *Höheren Realschulen* of Ger-

many, and to the *Enseignement Secondaire Special* of France. It is an obligatory study for the law students in the universities, and it must include the theory of statistics and the statistics of the kingdom. The professors of the universities are free, however, as regards the lessons they may offer, and they are accustomed to develop in each year those parts of their respective programmes which they think most convenient. The programmes of the courses of the most learned of the professors of statistics, namely, Senator Messedaglia, of the University of Rome, and Senator Boccardo, formerly Professor of the University of Genoa, and now Consigliere di Stato, for the academic year 1888–89, and of Prof. Carlo F. Ferraris, of the University of Padua, were as follows: —

COURSE OF STATISTICS

HELD BY PROF. A. MESSEDAGLIA (SENATOR OF THE KINGDOM) IN THE UNIVERSITY OF ROME.

A. THEORY OF STATISTICS.

I. General idea of statistics and its conception as a social science.

II. Origin and historic development of statistical science. Double order of inquiries and studies: Historical-political, and mathematical. Statistics as now understood.

III. Analysis of the knowledge of statistics.

1. Object of statistics. Nature and conditions of the statistical data.
2. Action and aim of statistics. Results, laws, casual relations; research and determination of the above topics. Nature and character of the statistical laws. Classification of the causes. Law of the accidental causes properly called.
3. The method. Logical characters of the statistical method properly considered. Its general application to the sciences of observation.

IV. Limits of statistics and its affinity with other sciences. Mathematics as an auxiliary science of statistics.

V. Present increasing importance of statistics.
   1. Considered scientifically and as aiding other sciences.
   2. Practically considered, in the ordinary contingencies of social life.

VI. Means and process of compiling statistics.
   1. Gathering of the data. Several methods for this topic.
   2. Criticising of the data.
   3. Elaboration of the data.
      a. Technical or material.
      b. Logical or scientifical.
   4. Tabulation and publication of the results.

VII. General rules for the discussion and application of the statistical data.
   Special study of the law of great numbers.

VIII. Study on the comparability of the data. General conditions of comparability and process of reduction necessary to render the data as comparable as possible.
   Particular applications to demographic, commercial, and financial statistics.
   Examination and comparison of Italian, French, and English budgets, or financial statements from the standpoint of their comparability.

IX. Mathematical methods, both analytical and geometrical, which find their application in statistics.
   The theory of the probability. Errors of observation. Empirical attainment. Geometrical constructions, or drawing as a way to represent and discuss the data.

X. General partition of statistics.
   1. Territory and climate.
   2. Population (Demography).
   3. Vitality.
   4. Economical and social conditions.
   5. Intellectual conditions.
   6. Moral conditions.
   7. Political conditions.
   A synthetic résumé of the several data which represent the social life of the country.

B. STATISTICS OF THE KINGDOM.

These are treated according to the data at hand, and always in the form of comparison, confronting province with province, when treating of home statistics, and Italy with other nations, when making international comparisons.

The method of instruction is usually by monographs upon different subjects, as, for example, population, criminal statistics, finances, etc., seeking to treat each as exhaustively and interestingly as possible. Thus, in the University of Rome, in the past scholastic year 1888–89, the programme of the statistics of population or demography included the following general inquiries: —

I. Population considered in its present condition. Corresponding statistical documents. General census as taken periodically. Other documents relative to it.

1. Absolute population, or considered only in its number, as a matter of fact. Actual and legal population.
2. Relative population, or in relation to the extent of the territory. Density. Map showing the distribution of the Italian population, according to the territorial extent. Centred and scattered population. Economical and social importance of the results of the above data.
3. Specific population.

a. Sex.

b. Civil condition (single, married, widowed).

c. Age. Economical and social importance of this inquiry. Difficulty in ascertaining it with accuracy; and relative corrections of the same.

Distribution by age in relation to births, deaths, and to the stationary or progressive condition of population.

Special comparisons with foreign countries. United States of America, France, Italy.

d. Nationality. Ethnographical statistics of Europe.

e. Religion. Religious statistics of Europe.

f. Trades and occupations. Methods and ways of obtaining the above data. International comparisons.

g. Property-holders.

h. Instruction.

i. Political condition.

k. Physical defects. Anthropometrical data.

II. Population considered in its movement. Corresponding statistical documents.

1. Intrinsic movement (natural reproductive power).

a. Marriages.

b. Births.

c. Deaths.

Each one of these topics studied in all its interesting aspects and in a comparative form.

2. Extrinsic movement (social, migratory changes). Emigration and immigration.

III. Statistical laws of the movement (Bionomy) in relation to the general economical conditions of population.

IV. Measure of vitality (Biometry). Tables of mortality and of surviving. Average life and probable life. Methods of constructing the above data.

COURSE OF STATISTICS

HELD BY PROF. G. BOCCARDO (SENATOR OF THE KINGDOM) IN THE UNIVERSITY OF GENOA.

1. Statistics as an art and as a science. Its historic evolution. Its relations with the other social sciences, more especially with the political economy.
2. The methods of research and those of exposition.
3. The law of great numbers. The means, averages, and median values. The statistical probability and prevision.
4. Distribution of the statistical researches.

a. Residence of people (territory, climate, etc.).

b. People.

c. Institutions of the people (government, religion, administration, etc.).

5. The statistics of the people (Demography) is more proper than any other part of the statistical research to be scientifically treated: reasons of that. Therefore, it is selected as the subject of the course.
6. Chief division of demography. Static and dynamic.
7. The practical basis of the static demography. The census. History and technics of the census. Comparative data.
8. The practical basis of the dynamic demography. The registers of the civil state. The theoretic population.
9. Nativity. Births of different sexes in time and space.
10. Mortality. Tables of mortality, and methods of their formation. Average age. Average life. Probability of life. Accidental death. Military death.
11. Marriage. Celibacy. Widowhood.
12. Emigration. Its different sorts. Its statistical and social effects.
13. The social classes. The professions. Property. Pauperism.

STATISTICS.

PROGRAMME OF LESSONS

By Prof. Carlo F. Ferraris, University of Padua, Italy.

INTRODUCTION.

I. Definitions of statistics.

II. Their theoretical divisions.

III. Their history.

PART I.* THEORY OF STATISTICS.

1. Statistics as an auxiliary method of induction. The analysis of facts with regard to their quality as a preliminary operation.
2. The collection of facts expressed in numbers.
3. The grouping of numbers. Notion of statistical quantities and series.
4. Elaboration of numbers. General notions, especially of the mathematical theories of application in statistics.
5. Elaboration of numbers (continued). Relative frequency of facts; proportional values.

* This part is fully treated every year.

6. Elaboration of numbers (continued). Averages.
7. Elaboration of numbers (continued). Some special and the most interesting applications c robability to social facts.
8. Interpretation of numbers. Regularity in phenomena and the law of causation.
9. Interpretation of numbers (continued). The logical methods for singling out the causes.
10. General results of statistical inquiry. Statistical laws.
11. Auxiliary operations in statistics and graphical figurations.

PART II. IMPORTANT QUESTIONS IN TECHNICAL STATISTICS.*

1. General census of population.
2. Special census of professions.
3. Registration of marriages, births and death, life tables, immigration and emigration.
4. Criminal statistics.
5. Statistics of economics, especially *a*, of money; *b*, of prices; *c*, of wages; *d*, of transports; *e*, of international trade.
6. Financial statistics.
7. Organization of official statistics.

PART III.† DESCRIPTIVE AND INQUIRING STATISTICS.

INTRODUCTION.

Notion of the social subjects, which may be the object of statistical description and inquiry.

1. The distribution of population on the country and its composition according to age, sex, and condition as to marriage (family condition, *stato civile*).
2. Marriages and births.
3. Migrations.
4. Wealth.
5. Intellectual culture.
6. The state and its forces.
7. Professions.

* Choice was made observing that statistics is explained to the students of the faculty of law and political science. Owing, however, to the shortness of the academic year, it is impossible to treat fully the matter in this and the following part every year.

† See the preceding note.

8. Criminality.
9. Biometry and mortality.
10. Law of population.

As regards the general methods of inquiry, the comparative form is always followed, and even in the theoretical part each rule is illustrated by examples and comparisons of facts; so also as regards the history of statistics, which is exemplified by particular references to some economical topics, as, for instance, to the general census of population. The general history of statistics in the Italian universities is often treated separately, as a part of a theoretical course, as has been done by Prof. Gabaglio, at the University of Pavia, in his well-known treatise.

The pamphlets of Prof. Messedaglia, "*Storia dei metalli preziosi*," "*La moneta*," "*I valori medi*," "*Statistica teorica ed italiana*," and "*La scienca statistica*," and Prof. Gabaglio's work, "*Teoria generale della statistica*," indicate most thoroughly the important position held by statistical science among Italian officials and educators, and the progress achieved in teaching that science in the Italian schools of superior instruction. The grand position indicated by the programmes given and the works cited is the direct outcome of the wonderful progress which the Italian government has made in the collection and presentation of statistical information. In the official statistics of Italy Signor Bodio has led the way, and the constant and rapid publication of statistical works of the very highest value, covering almost every important feature of social and industrial life, offer examples for other countries.

While much of the work in the Italian schools may be easily obtained from the yearly Reports of Commerce and Industries of Italy and other countries, it will be seen from the programmes that in Italy much importance is given to the methods and history of statistics, and that as regards the application of statistical science great stress is laid upon its demographical and moral aspects.

It is only recently that Sig. Egisto Rossi, well and personally known to members of our association, published a work on public instruction in the United States, entitled "*La istruzione publica negli Stati Uniti*," for the benefit of the Italian people. I am not aware that anywhere, in the English language, is there so complete and so compact a statement of all the important features of public instruction in the United States. This is only an instance of the efficiency and the wide-reaching efforts of the Italian government in placing before its people the results of research. Augmenting this official work with the very best methods of teaching statistical science, not only in the universities, but in the technical institutes, Italy is making strides in statistical science that may well excite our admiration and stimulate our emulation.

STATISTICS OF PRIVATE CORPORATIONS.

By Roland P. Falkner, Ph.D.,

University of Pennsylvania.

The rapid growth of private corporations is one of the striking features of the present industrial development. More prominent perhaps in the United States than elsewhere, it is nevertheless to be observed in all countries which have felt the spur of recent industrial progress. It has been accepted here as a necessary concomitant of modern methods of doing business, and there has been little disposition to object to the principle of stock companies or corporations. Certain forms of corporations have at various times been the target of hostile legislation, but in general the tenor of our laws has been favorable to the growth of corporations. It cannot be our purpose to review here the legislation on the subject. We can only note the fact that legislation on the subject of the foundation and conduct of corporative enterprises has been rather lax, and that very few guarantees in the interest of the public have been required. Or, to state the proposition inversely, very few hindrances have, at least since the passage of general incorporation laws, been placed in the way of persons desiring to secure charters. Under these circumstances there has been the fullest latitude allowed for the operation of all those forces which have tended to further the growth. As a result, corporations have multiplied in the United States in a manner unheard of in countries whose legislation contains more restrictive features. According to the figures given in the new German encyclopædia (*Handwoerterbuch der Staatswissenschaften*, Article, *Aktiengesellschaften, Statistik*) such companies were founded in European countries for the year 1885 as follows: Austria, 10; Belgium, 472; France, 325; German Empire, except

Bavaria, 70; Great Britian and Ireland, 1,405. It is impossible to say how many were founded in the same year in the United States, but a glance at the table given later will show that the number must have been far greater even than that given for Great Britain and Ireland, since ten states only for which we have figures show a total of 1,779. In view of such an extraordinary record as this, it may not be out of place to study the growth of corporations with such material as we have at hand, pointing out the reasons which have led to it, and endeavoring to ascertain in what degree we may be able to secure for it a statistical measure.

We need not go far to seek the causes which lead to the foundation of corporations. They are economic and legal advantages over the conduct of enterprises by individuals or private firms. Corporations are founded for carrying on large enterprises for which the capital of individuals or groups of individuals is insufficient. This is their economic justification, and their services to the cause of industrial progress in making available sufficient capital for great enterprises like our railroads and ship canals have always been duly recognized. The inability, however, of securing a sufficient capital by other means is not the only reason leading to the foundation of corporative enterprises. A corporation possesses distinct advantages over the individual or business firm in its limited liability, and in its perpetuity. The latter point is of extreme importance. It renders an investment of capital secure as long as the business prospers. The business firm dissolves by the death of a member. The holder of the stock of a corporation, on the other hand, knows that at his death his heirs need not disturb the investment of the capital, and if they do so the enterprise itself is not interrupted but simply changes owners. Again, the form of a corporation renders changes in ownership very easy. Numerous corporations are formed simply and only for the purpose of getting rid of an enterprise which cannot readily be sold in any other way. These legal features are of much

importance also in the case of corporations which require for the exercise of their business the grant of franchises from public bodies. Wholly apart from the charge of monopoly which would be raised if a city, for example, were to give a private individual the right to construct a street railroad, it would hesitate to enter into such a contract for any number of years with a person who might soon die, and thus cause the contract to fall.

It is not our purpose to discuss here the relative justification of corporations founded upon one reason or the other. The question whether the formation of corporations simply for the legal advantages which result from this form of organization is to be approved cannot be answered by statistical means. Its discussion here would be out of place. In the following pages it shall be our endeavor to bring out simply the facts in regard to corporations, so far as our material will allow.

The materials at our disposal for a statistical study of corporations in the United States are neither numerous or complete. In the course of the following discussion no use has been made of the stock exchange manuals in which there is a great deal of information to be found, for these omit many corporations of prime importance for our investigation. What are termed mercantile stocks do not cut a very prominent figure in these manuals, and yet these are the most striking feature in the more recent history of corporative undertakings.

In the following tables we deal exclusively with figures gathered from official lists of charters granted to incorporations, which are usually compiled from the records in the office of the Secretaries of State. The list which follows shows the states which make such a publication and the document in which it may be found.

ALABAMA. No published list.
ARKANSAS. Secretary of State Report since 1886.

CALIFORNIA. No published list except in 1886. Records with Secretary of State.
COLORADO. Secretary of State Report since 1881.
CONNECTICUT. Vols. 8, 9, and 10. Special Laws.
DELAWARE. No published list.
FLORIDA. Secretary of State Report.
GEORGIA. No published list.
ILLINOIS. No published list.
INDIANA. No published list. Records with Secretary of State.
IOWA. No published list.
KANSAS. No published list.
KENTUCKY. No published list.
LOUISIANA. No published list.
MAINE. Business Corporations list since 1887.
MARYLAND. No published list. No records with Secretary of State.
MASSACHUSETTS. Commissioner of Corporations Report since 1863.
MICHIGAN. No published list.
MINNESOTA. Secretary of State Report.
MISSISSIPPI. Secretary of State Report since 1878.
MISSOURI. Missouri Manual for 1887–88, not previously.
NEBRASKA. Secretary of State Report since 1880.
NEVADA. No published list. Records with Secretary of State.
NEW HAMPSHIRE. No published list.
NEW JERSEY. List now in preparation.
NEW YORK. No published list.
NORTH CAROLINA. No published list.
OHIO. Ohio Statistics since 1871.
OREGON. Secretary of State Report since 1867.
PENNSYLVANIA. Pamphlet laws since 1874.
RHODE ISLAND. No published list.
SOUTH CAROLINA. Secretary of State Report since 1886.
TENNESSEE. No published list.
TEXAS. Secretary of State Report, 1888.
VERMONT. No published list.
VIRGINIA. Acts of Assembly since 1879–80.
WEST VIRGINIA. No published list. Records with Secretary of State.
WISCONSIN. Secretary of State Report since 1869.

The most casual glance at the list shows that we have data for comparatively few states. In all of these they are not available for purposes of comparison. In such circumstances we cannot hope to carry out certain lines of investigation. It would be useless to attempt even to estimate the total number of corporations chartered in any one year in order to compare this with figures for foreign countries. In many cases, however, in which the statistician may require complete figures to establish ratios between the subject of his study and others, he is able, nevertheless, to detect well defined tendencies even with the most incomplete data. It is with such general tendencies that we are concerned in this study. It is believed that, despite the many defects in the material, we may still reach some results of value to the student.

All the states mentioned in the list as publishing data do not figure in the tables which follow. For Oregon it was impossible for the writer to secure the reports. The report of the Secretary of State of Florida gives an account of his dealings with incorporated companies, but it is not clearly stated which relate to granting charters, and which to amending already existing ones. In Pennsylvania the list published in the pamphlet laws was, in the earlier numbers, made up to the date of publishing the laws, which was in some cases more, in some less, than a year from the last previous date of publication. More recently the list has been published for a biennial period, without any indication of the year in which the charter of each corporation is issued. The same holds true of the lists for Virginia. It is evident, therefore, that these states could not be introduced into the tables.

The lists to be found for the remaining states differ very considerably in their nature, and it must be our first task to ascertain in what degree this fact limits the use that may be made of them. The figures relate in the first place to different years, in some cases the calendar year, in others the fiscal years of the respective states. Again, the figures do not in-

clude all corporations chartered in the given year, but only those organized under general laws. An exception is in the case of Maine in the first table, in which all corporations are included. As a result of omitting corporations which are created by special acts, our figures are not exhaustive. The fact that a state has a general incorporation act does not warrant us in inferring that it does not grant charters by special legislation. For example, Massachusetts chartered in 1889 nine corporations for business purposes by special act, in addition to those organized under the general law. In other states the number is much greater, as, for instance, in Connecticut. Again, certain categories of corporations do not figure in the lists. Such, for instance, are railroad companies, which offer so many peculiarities that they can be better studied as a separate subject. Our present concern is with what are termed miscellaneous corporations. In the northern states this will not include banks as a rule, and in some insurance companies are not included. The exact facts will depend on the degree in which special officials are charged with the supervision of these special classes of corporations. The great bulk of corporations for business purposes will nevertheless be included in our figures, and the number for each state will be large enough for the purposes of our investigation. Enough has however been said to show that we cannot compare one state with another in the figures which we will present. Our comparisons must be confined to the figures for the different years for the same state. We can now proceed to the study of the actual figures with a clearer comprehension of their meaning than would have been possible without this extended discussion of the material.

We give in Table I the number of charters granted to corporations in several states for a series of years.

In this table we are able in some cases to give extended lists of figures, as some states in commencing the publication of periodical lists published also lists covering the previous years represented in the hitherto unpublished records. There

Table I. CORPORATIONS CHARTERED.

	Arkansas.[1]	Colorado.[2]	Connecticut.	Maine.	Massachusetts.	Minnesota.[3]	Mississippi.[4]	Missouri.	Nebraska.[5]	Ohio.[6]	S. Carolina.	Texas.	Wisconsin.[7]
1820	....	....	....	3	....	....	....	....	....	....	..	....	....
1821	....	....	....	14	....	....	....	....	....	....	..	....	....
1822	....	....	....	10	....	....	....	....	....	....	..	....	....
1823	....	....	....	13	....	....	....	....	....	....	..	....	....
1824	....	....	....	9	....	....	....	....	....	....	..	....	....
1825	....	....	....	18	....	....	....	....	....	....	..	....	....
1826	....	....	....	18	....	....	....	....	....	....	..	....	....
1827	....	....	....	19	....	....	....	....	....	....	..	....	....
1828	....	....	....	12	....	....	....	....	....	....	..	....	....
1829	....	....	....	16	....	....	....	....	....	....	..	....	....
1830	....	....	....	13	....	....	....	....	....	....	..	....	....
1831	....	....	....	19	....	....	....	....	....	....	..	....	....
1832	....	....	....	21	....	....	....	....	....	....	..	....	....
1833	....	....	....	25	....	....	....	....	....	....	..	....	....
1834	....	....	....	44	....	....	....	....	....	....	..	....	....
1835	....	....	....	25	....	....	....	....	....	....	..	....	....
1836	....	....	....	129	....	....	....	....	....	....	..	....	....
1837	....	....	13	106	....	....	....	....	....	....	..	....	....
1838	....	....	22	33	....	....	....	....	....	....	..	....	....
1839	....	....	10	15	....	....	....	....	....	....	..	....	....
1840	....	....	4	3	....	....	....	....	....	....	..	....	....
1841	....	....	10	18	....	....	....	....	....	....	..	....	....
1842	....	....	5	11	....	....	....	....	....	....	..	....	....
1843	....	....	8	10	....	....	....	....	....	....	..	....	....
1844	....	....	9	17	....	....	....	....	....	....	..	....	....
1845	....	....	19	29	....	....	....	....	....	....	..	....	....
1846	....	....	18	43	....	....	....	....	....	....	..	....	....
1847	....	....	26	32	....	....	....	....	....	....	..	....	....
1848	....	....	14	28	....	....	....	....	....	....	..	....	....
1849	....	....	29	34	....	....	....	....	....	....	..	....	....
1850	....	....	38	25	....	....	....	....	....	....	..	....	....
1851	....	....	44	9	8	....	....	....	....	....	..	....	....
1852	....	....	85	54	20	....	....	....	....	....	..	....	....
1853	....	....	132	61	21	....	....	....	....	....	..	....	....
1854	....	....	107	63	13	....	....	....	....	....	..	....	....
1855	....	....	48	32	31	....	....	....	....	....	..	....	....
1856	....	....	26	38	27	....	....	....	....	....	..	....	....
1857	....	....	28	38	25	....	....	....	....	....	..	....	....
1858	....	....	18	14	11	....	....	....	....	....	..	....	....
1859	....	....	22	30	20	....	....	....	....	....	..	....	....
1860	....	....	26	31	21	....	....	....	....	....	..	....	....
1861	....	....	14	15	16	....	....	....	....	....	..	....	....
1862	....	....	18	17	20	....	....	....	....	....	..	....	....
1863	....	....	27	15	56	....	....	....	....	....	..	....	....
1864	....	....	77	32	174	....	....	....	....	....	..	....	....
1865	....	....	94	33	136	....	....	....	....	....	..	....	....
1866	....	....	22	59	163	....	....	....	....	....	..	....	....
1867	....	....	65	55	87	....	....	....	....	....	..	....	....
1868	....	....	72	56	89	....	....	....	....	....	..	....	....
1869	....	....	66	65	56	....	....	....	....	....	..	....	9
1870	....	....	62	77	29	....	....	....	....	....	..	....	10
1871	....	....	....	72	88	....	....	....	...	348	..	....	8
1872	....	....	....	64	82	....	....	....	....	387	..	55	25
1873	....	....	....	92	89	....	.. .	....	....	386	..	82	54
1874	....	....	....	111	78	....	....	....	....	279	..	91	41
1875	....	....	....	76	85	....	....	....	....	346	..	209	67
1876	....	....	....	26	63	....	....	....	....	261	..	153	47
1877	....	....	....	44	71	....	....	....	....	242	..	77	53
1878	....	....	....	35	68	....	5	....	....	226	..	81	58
1879	....	....	....	69	75	....	5	....	12	294	..	80	....
1880	....	....	....	262	145	....	14	....	14	392	..	91	90
1881	....	1129	95	269	153	....	27	....	27	477	..	163	99
1882	....	505	94	233	141	....	206	....	36	581	..	200	164
1883	....	....	101	255	135	118	39	....	58	602	..	280	190
1884	....	....	76	226	143	233	33	....	76	507	..	263	189
1885	38	....	93	241	113	215	29	....	63	578	..	226	183
1886	62	....	98	229	143	289	38	....	113	621	..	163	262
1887	118	450	115	362	155	397	57	407	203	775	20	288	579
1888	121	470	108	302	195	404	69	446	207	664	49	271	383
1889	....	....	....	368	233	372	85	....	....	748	78	....	....

[1] Manufacturing corporations. [2] Year ends Nov. 30th. [3] Year ends July 31st. [4] Includes companies with capital before 1884. After that date no figures as to capital being found in the reports. I have given the number of such corporations as were *apparently* business corporations. In 1882 there were 17 such, the remainder being marriage associations. [5] Year ends Nov. 30th. [6] Year ends Nov. 15th. Includes railroad companies. [7] Year ends Sept. 30th.

are however some unfortunate gaps in the table. Connecticut published in 1870 a list of corporations chartered previous to that date, but in 1880 the published list contained only such companies as were then in existence. As a consequence the intervening years had to remain blank in our table. The gaps under Wisconsin and Colorado, on the other hand, occur through my inability to secure the reports. In passing, it may be well to explain that the enormous number of corporations in Colorado in the year 1881 is due to the formation of mining companies in that year on the wholesale.

A study of the foregoing table shows a constant increase in the number of corporations chartered from year to year. This increase is not however uniform, but follows the ups and downs of business prosperity with great regularity. The influence of periods of speculation can be read very clearly in the figures of the table. Thus in Maine the number chartered in the years 1836 is not reached again until we reach the year 1880, and the number chartered in 1837 is only exceeded by one year before the same date. Again, we would call attention to the small number chartered in the year 1858. In more recent times we can see the influence of the speculative period which culminated in the crisis of 1873. Despite however these fits and starts, which index in a measure the business prosperity of the time, the general tendency has been to increase. This has been notably the case since the year 1880. It seems almost as if this year were the dividing line between an old and new period.

It is not an uninteresting study to observe how the character of corporations has changed during the period for which we have figures. So far as the names of corporations are any indication of the purposes for which they are formed, the Maine list gives us some insight into this matter. In earlier days the companies which figure most largely are stage companies, road companies, canal companies, and insurance companies. Later on railroads assume more import-

ance, and at the same time the number of gas companies grows rapidly as this form of lighting is introduced into cities. In the last decade the growth has been mainly among manufacturing companies. The same facts are brought out in Table II, which gives the different species of corporations chartered in Ohio for a series of years.

It will be noticed here that certain things at one time very prominent entirely disappear later on, as, for instance, turnpike companies. Railroads also are much more of a feature in the years 1851–73, for which a summary is given, than they are in the concluding years of the table. Manufacturing companies have constantly grown in importance. On the other hand, insurance companies remain stationary. Electric light and power companies are of course unknown in the earlier period, while the discovery of natural gas has since the year 1885 greatly increased the number of gas companies. In a measure, we have a picture in the figures of the changes which have occurred in the business of the country during the last forty years. It cannot be denied that the picture would be less indistinct by the calculation of percentages, but as it stands the outlines may be discovered.

Some of the lists permit a study of the capital of corporations chartered. Table III gives us certain facts with reference to Massachusetts.

This table distinctly shows that the recent growth in the number of corporations has not been due to the inauguration of numerous enterprises requiring vast capital, but to the application of this form of doing business to enterprises with small capital. This is undoubtedly a departure from the idea under which companies were first formed. It has therefore been called an unnatural development of the corporation. This is not, however, to be discussed here; it is our purpose to ascertain simply the facts in the case. Looking at the averages, we see an irregular but, on the whole, constant decline in the average capital per corporation. It seems proper to overlook the period before 1860 in this mat-

Table II. PURPOSES FOR WHICH CORPORATIONS WERE CHARTERED IN EACH YEAR IN OHIO.

Year.	Banks, Savings and Loan Associations.	Building and Loan Associations.	Co-operative Trade Associations.	Electric Light and Power Companies.	Gas Companies.	Insurance Companies. Fire and Life.	Manufacturing Companies.	Mining Companies.	Plank Road Companies.	Printing and Publishing Companies.	Railroad Companies.	Street Railroad Companies.	Telegraph and Telephone Companies.	Turnpike Companies.	Companies for various purposes.	Total.
1871	..	93	2	..	4	5	118	29	..	15	47	11	..	5	19	348
1872	..	57	..	..	...	3	134	55	..	12	62	14	..	6	44	387
1873	21	64	2	..	4	6	138	39	1	20	32	17	3	3	36	386
1874	12	47	3	..	7	2	99	28	2	13	12	10	..	8	36	279
1875	18	64	7	..	4	5	95	28	..	11	28	20	3	1	52	346
1876	10	38	40	..	3	11	57	23	..	11	26	5	4	8	25	261
1877	5	32	29	..	2	27	57	12	..	12	28	4	4	5	45	242
1878	2	28	8	..	8	4	71	14	1	10	30	4	..	4	42	226
1879	2	34	5	..	6	3	110	28	2	6	27	5	..	2	64	294
1880	..	56	7	..	2	1	176	41	..	11	35	6	19	...	38	392
1881	2	47	4	19	5	7	171	31	..	16	67	4	15	...	89	477
1882	4	75	4	4	5	4	283	34	..	19	42	6	6	...	95	581
1883	11	97	8	16	8	3	250	35	..	26	37	4	6	...	101	602
1884	10	58	5	15	10	8	200	23	..	25	18	5	9	...	121	507
1885	2	52	5	8	37	7	196	18	..	28	17	5	28	...	165	578
1886	6	62	3	11	89	23	205	17	..	26	27	7	26	...	119	621
1887	11	84	22	20	183	15	257	30	..	19	36	23	19	...	156	775
1888	6	93	6	25	36	8	277	31	..	29	20	10	1	...	122	664
1889	13	90	4	51	30	8	312	23	..	16	24	19	2	...	156	748
1851–73	21	450	27	..	77	112	1,011	324	45	100	360	118	13	300	998	3,956

Table III. CORPORATIONS CHARTERED UNDER GENERAL LAWS OF MASSACHUSETTS.

	Number.	Capital.	Average Capital.	Capital in Groups of Thousand Dollars.											
				Under 5	5-10	10-20	20-30	30-50	50-100	100-250	250-500	500-1000	1000-3000	3000-5000	5000 and over.
1851	8	$409,800	$51,225	..	2	1	..	2	1	2	..	..	..	..	..
1852	20	985,800	49,260	..	4	3	2	2	6	3	..	..	..	..	..
1853	21	2,022,000	95,810	..	2	2	3	5	4	4	..	1	..	..	..
1854	13	783,000	60,231	..	..	1	5	3	..	4	..	..	..	..	..
1855	31	1,688,100	54,455	..	4	8	5	2	6	5	1	..	..	..	..
1856	27	1,857,900	69,181	..	5	3	3	4	7	3	1	1	..	..	..
1857	25	1,663,500	66,540	..	3	4	7	4	4	1	..	2	..	..	..
1858	11	563,500	51,318	..	..	3	1	3	2	2	..	..	..	..	..
1859	20	1,775,000	88,750	..	..	5	3	1	3	7	..	1	..	..	..
1860	21	3,520,750	120,036	1	4	3	2	1	4	2	3	..	1	..	..
1861	16	746,200	46,637	..	2	4	2	..	4	4	..	..	..	..	..
1862	20	1,211,863	60,593	..	3	2	3	2	5	4	..	..	..	..	..
1863	56	10,878,000	194,250	..	2	3	6	3	4	18	12	8	..	..	..
1864	174	43,878,000	252,172	..	..	5	4	8	17	57	44	39	..	..	..
1865	136	26,315,500	193,496	..	2	1	8	10	18	54	25	18	..	..	..
1866	103	14,450,500	140,296	..	1	7	9	6	21	39	16	4	..	..	..
1867	87	9,721,000	111,735	..	3	2	7	14	23	27	8	3	..	..	..
1868	89	10,868,975	122,123	..	7	6	10	5	18	29	7	7	..	..	..
1869	56	6,455,300	115,273	..	..	4	6	6	14	19	3	4	..	..	..
1870	29	3,405,000	117,414	..	1	3	4	3	5	9	2	2	..	..	..
1871	88	10,197,950	115,772	7	5	6	11	12	11	21	9	6	..	..	..
1872	82	10,687,850	129,120	6	6	6	10	5	15	20	6	7	1	..	..
1873	89	8,737,450	98,286	6	4	10	10	13	18	19	4	4	1	..	..
1874	78	5,370,360	68,722	4	10	13	7	11	14	12	6	1	..	..	..
1875	85	5,352,650	62,972	17	4	8	13	11	13	15	3	1	..	..	..
1876	63	4,100,210	65,083	17	3	12	4	3	9	10	3	2	..	..	..
1877	71	5,827,375	82,076	7	8	12	8	6	17	10	3	..	..	..	..
1878	68	5,090,750	74,864	7	12	9	9	8	7	12	3	..	1	..	..
1879	75	6,027,925	80,372	6	11	11	7	7	15	12	3	2	1	..	..
1880	145	19,755,480	136,245	6	14	24	16	15	21	32	11	5	..	..	1
1881	153	14,842,100	97,007	12	21	25	15	10	18	35	10	5	2	..	..
1882	141	9,436,820	66,927	14	17	28	19	14	20	21	4	3	1	..	..
1883	135	9,792,100	72,534	8	25	22	12	17	22	19	5	4	1	..	..
1884	143	9,676,300	67,597	5	17	33	15	18	20	25	7	3	..	..	..
1885	113	5,472,700	48,431	12	23	19	15	9	15	15	4	1	..	..	..
1886	143	5,507,750	38,516	20	24	34	20	12	14	15	4	..	..	..	..
1887	155	6,514,300	42,018	16	29	33	16	23	8	18	16	2	2	..	..
1888	195	10,592,950	54,317	16	29	43	35	22	18	23	5	3	1	..	..
1889	233	10,669,235	45,705	23	29	57	44	24	25	20	9	2	..	..	..

NOTE.— The figures given in the above table represent as far as possible only business corporations. Since the year 1880 these have had a separate list in the reports. Previous to that date it was a comparatively easy matter to separate out such corporations which, though having capital, were not organized for strictly business purposes. This will account for discrepancies between figures given here and in the reports.

ter, as there was at that time a totally different meaning attached to the ideas small and large capital. For the period subsequent to that date the fact is apparent. One may also compare the average capital of the corporations chartered in 1889, $45,705, with that of the corporations sending in annual returns in the same year, which was $167,907. If we turn now to the groups into which we have classified the capital, we find that from 1863 to 1881 the largest group each year is either that of $100,000 to $250,000 or, in three years only, that of $50,000 to $100,000, whereas after the year 1881 the most numerous group is either that of $10,000 to $20,000 or, in two cases, that of $5,000 to $10,000. Again, make the amount $30,000 a dividing line, and it will be seen that in the first period here alluded to the majority of all corporations is on the upper side of the line, and in the latter period on the lower. The reader will be surprised to note the large number of corporations whose capital does not exceed $5,000. The greater part of these are coöperative associations, though not exclusively so. In this class one finds in Massachusetts and elsewhere a considerable number of creamery associations.

The fact here established, at least so far as Massachusetts is concerned, is of the first importance. It indicates that companies are formed not so much because of the economic difficulty of conducting enterprises on any other basis, but because of other, legal, advantages which arise from this form of employing capital. There is ample reason to suppose that in many of the cases here classified there is no new enterprise whatever, but merely a conversion into a corporation of a business hitherto carried on successfully by a private firm. We shall return to this point later. The main result of our investigation thus far, that the recent growth has been mainly among the smaller companies, is capable of further proof. In view of the importance of this point, we present additional tables on the subject. Table IV gives the facts for the manufacturing corporations chartered in Ohio for a series of years.

Table IV.

CAPITAL OF MANUFACTURING CORPORATIONS CHARTERED IN OHIO, UNDER GENERAL LAWS.

Year.	Number.	Capital.	Average Capital.	Capital in Groups of Thousand Dollars.										
				Under 5	5–10	10–20	20–30	30–50	50–100	100–250	250–500	500–1000	1000–3000	3000–5000	5000 and over.
1872	134	$17,554,500	$131,004	..	2	5	15	12	36	50	5	5	4	..	..
1873	138	16,321,000	118,268	1	1	10	16	12	35	45	10	8	1	..	..
1874	99	9,172,500	92,651	2	3	7	9	13	29	29	5	2	..	..	..
1875	95	15,381,500	161,910	1	5	9	13	6	25	26	5	3	2	..	..
1876	57	5,309,000	93,140	1	2	4	5	4	13	24	4	..	..	..	..
1877	57	8,529,000	149,632	..	1	6	8	5	10	18	5	3	1	..	..
1878	71	13,841,400	180,865	1	6	7	8	4	16	23	2	1	2	..	1
1879	110	18,477,600	167,979	3	5	13	16	13	30	23	6	..	1	..	1
1880	176	24,363,000	138,426	3	12	30	26	23	29	31	8	9	4	..	1
1881	171	19,917,000	116,474	5	10	18	22	12	33	51	12	5	3	..	..
1882	283	36,225,750	128,006	6	11	33	41	27	60	59	24	13	9	..	..
1883	250	20,730,500	82,922	3	11	29	40	25	59	59	18	4	2	..	..
1884	200	22,579,600	112,898	4	16	26	28	17	45	44	12	5	2	..	1
1885	196	17,141,500	87,456	5	11	35	32	9	49	37	10	7	1	..	..
1886	205	27,410,900	137,151	10	21	31	40	9	39	37	12	2	2	..	2
1887	257	19,161,900	74,949	3	26	39	52	14	53	54	8	6	2	..	..
1888	277	17,530,850	69,176	9	21	32	60	14	80	48	8	4	1	..	..
1889	312	28,996,300	92,937	12	18	54	57	28	71	58	9	2	2	..	1

The growth of small corporations is not seen quite so clearly in this table as in the preceding. Yet it will be observed that in the later years the average capital per corporation varies between decidedly lower limits than in the earlier years of the table. In the groups also we can observe that the groups $10,000 to $20,000 and $20,000 to $30,000 increase in importance as compared with the groups $50,000 to $100.000 and $100,000 to $250,000. Make in this case a dividing line at $50,000, and it will be seen that the number below this, at first considerably less than that above, becomes later almost the same as the latter.

In Table V, which follows, giving the facts for some other states, we do not find the growth of small corporations observed in Ohio and Massachusetts. In the western states, however, mining companies play a more important part, and this brings about the great irregularities observed in the

averages. It is not improbable that, if such companies could be sifted out, the fact elsewhere observed could be seen here also. The figures of the two preceding tables establish the fact very plainly for the eastern portion of the country, an inference that receives additional weight from the fact that such a development has been observed in European countries. Table V, which shows that our generalizations must not be carried too far, follows.

It is a matter of common observation that existing business enterprises are often turned into corporations for some advantages expected to flow from this form of organization. It is therefore evident that the new corporations do not represent new enterprises exclusively, or new investments of capital. The question arises, to what extent this is the case. A partial answer at least can be gleaned from the Massachusetts reports. All companies are required to report to the commissioner of corporations that the capital stock has been paid in, and also in what form of property such payment has been made. The facts upon these points are given in Table VI.

It is very clear from the foregoing table that the payment of cash is a small part of the capital actually invested in corporations, from which we may very readily infer that the great majority of corporations are formed on the basis of previously existing enterprises. This receives additional support from the fact that of the corporations certifying to the payment of capital in 1885 there were only seven in which the total capital was paid in cash, in 1886 twenty-two, in 1887 sixteen, in 1888 twenty-five, and in 1889 forty-one. If we ask whether the new investments of capital tend to change in the period observed, we find little change between the earlier and later years of our table. If differences exist at all, they are rather in favor of the later period, in which the investment of cash seems to bear a larger proportion of the amount invested than formerly.

The figures which have thus far been presented relate to

Table V. CAPITAL OF CORPORATIONS.

	Year.	Number.	Capital.	Average Capital.	Capital in Groups of Thousands Dollars.										
					Under 5	5–10	10–20	20–30	30–50	50–100	100–250	250–500	500–1000	1000–3000	3000–5000	5000 and over.
Wisconsin.	1880	90	$8,246,050	$91,623	21	6	11	17	5	6	18	2	2	2	..	..
	1881	99	15,064,090	152,162	15	6	15	10	4	22	15	3	5	3	1	..
	1882	164	13,647,114	83,214	23	13	29	21	14	19	23	18	3	1	..	..
	1883	190	33,745,400	177,607	15	16	28	25	13	15	30	12	19	6	..	1
	1884	189	27,355,070	144,736	30	20	24	26	17	24	23	9	9	5	1	1
	1885	183	14,138,951	77,808	41	15	31	20	10	19	33	4	8	2	..	..
	1886	262	85,890,080	324,008	29	20	32	36	15	32	33	5	18	39	2	1
Nebraska.	1879	12	6,508,000	542,333	..	1	4	..	1	4	1	..	..	..	..	1
	1880	14	7,302,000	521,572	2	1	..	4	..	2	2	1	1	..	..	1
	1881	27	1,416,600	52,466	4	1	2	6	2	7	4	1	..	..	..	..
	1882	36	3,107,500	86,319	3	3	4	2	3	8	9	4	..	..	..	..
	1883	58	13,030,600	221,028	10	4	9	8	2	7	11	4	2	..	..	1
	1884	76	8,390,650	110,403	7	7	8	15	4	14	14	..	4	3	..	..
	1885	63	12,287,000	194,888	2	5	4	7	7	16	11	4	6	2	1	..
	1886	113	19,123,300	169,233	5	4	15	19	12	24	27	3	2	1	..	1
	1887	203	34,832,300	171,587	5	15	20	31	14	35	47	6	20	7	3	..
	1888	207	65,636,240	317,083	10	4	25	27	14	57	32	14	12	4	1	7
Arkansas.	1885	38	6,777,825	178,364	7	3	6	5	3	10	2	..	1	..	..	1
	1886	62	49,333,200	795,697	6	8	9	4	9	8	5	1	1	2	3	6
	1887	118	101,789,700	862,625	7	13	16	7	7	25	6	4	6	7	9	11
	1888	121	18,378,050	151,885	10	8	17	20	9	27	13	5	6	3	..	3
S. Carolina.	1887	20	906,300	45,315	1	..	3	5	2	6	3	..	..	..	..	..
	1888	49	2,395,325	48,884	4	3	12	9	7	5	7	2	..	..	..	..
	1889	78	2,812,100	36,052	12	6	16	15	5	12	12	..	..	..	..	..
Mississippi.	1878	5	125,000	25,000	..	1	2	..	..	2	..	..	..	..	..	..
	1879	5	250,000	50,000	..	...	..	..	..	5	..	..	..	..	..	..
	1880	14	335,500	23,964	3	...	5	2	1	2	1	..	..	..	..	..
	1881	27	1,555,000	57,592	5	2	2	5	3	7	1	1	1	..	..	..
	1882	206	7,054,800	34,246	6	122	50	8	2	7	7	1	..	3	..	..
	1883	39	2,920,300	74,879	6	3	1	6	2	16	4	2	2	..	..	..
Missouri.	1887	407	27,941,885	68,653	45	46	76	52	42	62	55	19	7	3	..	..
	1888	446	28,761,340	64,483	50	64	80	60	45	72	52	12	6	5	..	..

the foundation of companies. It would be very instructive if we could add data as complete on the duration of the companies, especially if, by showing how many companies founded in each year survive after a given period, we could charac-

Table VI. PAYMENT OF CAPITAL. CORPORATIONS IN MASSACHUSETTS.

Year.	Number.	Capital Paid in.	Capital paid in.				Number of Corporations of which Capital is wholly or partially paid in.			
			In Real Estate.	In Personal Estate.	In Mixed Estate.	In Cash.	Real Estate.	Personal Estate.	Mixed.	Cash.
1870	26	$1,617,000	$73,164	$864,784	$285,779	$393,895	6	16	5	15
1871	63	5,673,654	1,323,005	2,422,596	1,668,175	259,878	20	40	19	21
1872	68	8,592,500	1,317,144	4,878,732	2,143,506	253,118	22	49	11	24
1873	74	9,875,800	1,277,176	4,319,248	3,956,586	322,790	21	51	15	22
1874	63	7,160,260	1,565,955	2,364,131	2,854,000	376,274	24	38	16	22
1875	86	6,889,060	711,431	2,940,235	2,675,550	671,834	23	56	20	32
1876	70	4,380,200	976,695	1,508,547	1,571,963	482,575	15	52	12	26
1877	71	5,669,775	1,775,842	1,427,972	1,444,767	1,021,374	23	47	11	30
1878	61	4,843,500	790,245	2,108,451	918,000	1,026,804	17	47	6	29
1879	48	2,909,500	522,779	1,682,784	372,000	421,937	12	31	6	25
1880	114	17,216,005	1,584,019	11,504,386	2,134,036	1,903,564	30	75	24	63
1881	119	10,578,400	1,351,986	4,994,727	2,995,425	1,236,262	30	77	23	57
1882	127	11,356,900	1,873,538	6,212,965	1,393,643	1,876,754	32	84	18	67
1883	117	10,833,900	2,253,450	3,088,066	3,164,210	1,728,174	33	76	21	67
1884	125	9,198,320	887,899	3,855,579	2,454,434	2,000,406	25	85	18	66
1885	80	5,307,200	634,851	2,752,272	577,631	1,342,446	19	75	17	45
1886	118	5,045,350	873,583	2,094,102	274,364	1,803,301	24	83	9	67
1887	121	5,698,900	1,706,886	2,917,030	.....	985,984	36	84	..	69
1888	142	7,302,250	1,535,495	3,577,693	.....	2,189,062	39	104	..	76
1889	183	9,967,035	4,684,461	3,710,009	.....	1,572,565	63	124	..	104

terize in a measure the period of foundation, as one of speculation or of sound conservative enterprise. Unfortunately for anything like this, the figures are conspicuously deficient. Here is the weak point in our statistics. We are only able to present one or two facts, which, of certain value as symp-

toms, can claim no further significance. In 1870 the state of Connecticut incorporated, as shown in Table I, sixty-two companies. In 1880 the Secretary of State published a list, giving the corporations under state laws then doing business in the state, and the number for 1870 was twenty-eight, or less than fifty per cent. In the same year, 1880, previous to the construction of the list mentioned, a statute of the state had annulled the charters of no less than 1,285 companies, most of which had probably long since ceased to have any actual existence. According to figures furnished in Table II, there were chartered 3,956 business corporations in Ohio in the years 1851–73, while in the latter year the county auditors reported only 1,148 companies as paying personal property taxes. This will show that it is utterly impossible to gather from the figures showing incorporations the number of corporations actually carrying on any business. It is not meant by this that such companies are peculiarly subject to failure, for the fact may be largely explained by the well-known fact that so many corporate enterprises never get any further than organization, which is a much simpler matter than obtaining subscriptions to the stock. In the state of Massachusetts, as already stated, corporations are required to file a certificate of the payment of their capital stock. Between the years 1870 and 1888 there were 2,204 corporations chartered in that state, but up to the end of the year 1889 certificates of the payment of capital had been filed by 1,889 corporations, leaving quite a number that never reached the point of collecting their capital. Many fail or go into voluntary liquidation after successfully starting. According to the requirements of the Massachusetts law, all business corporations must make an annual report of condition to the commissioner of corporations. Failure to do so leads to an annullment of the charter. In 1870 there were 181 corporations making such returns. From 1870 to 1888 there were chartered, as shown in Table III, 2,051 corporations, or a total of 2,232, which, if all were in existence, should make returns in 1889. But the number making returns in the last year was

1,369, leaving 863 unaccounted for. Some never paid in their capital stock, as already seen, and the remainder have dropped off on the way. The question naturally arises, Is not this a very large percentage of falling off? Unfortunately, there are no means of answering the question. To do so we should have to compare the figures given with the number of business enterprises of every description started and discontinued.

The results of our investigation are sufficiently clear to require no special summing up. In conclusion, some remarks on the statistics themselves may not be out of place. It is rather surprising that in a matter of such general interest so few states should publish even the lists of companies incorporated. As long as this remains the case it will be impossible to secure anything like exhaustive figures on the subject. Looking through the reports of the different Secretaries of State, I find suggestions on the subject of annual returns in several cases. If carried out, these would give us valuable figures, especially in states where the formalities of taking out certificates of incorporation are not so strict as in Massachusetts, whose laws on the subject of corporations are the most complete of any state in the Union. Beyond the few points touched on in the preceding pages the statistics of private corporations cannot go without the expenditure of a great deal of effort. Much remains to be done to perfect the points which we have discussed. To take up new points, the principal which suggest themselves are a comparison of the number of new corporations with new business firms, as well as the failures in each class. Again, considerable information could be gained from the dividends paid by companies. It will readily be seen that these desirable points hardly come within the range of practicability except for some special investigation furnished with large means. For some reason or other, corporations as such have never sufficiently occupied public attention to become the subject of official investigation either in this country or in Europe. The attainable facts for foreign countries, therefore, do not go much further than those furnished here for single states of this country.

REVIEWS AND NOTICES.

ENGLISH LABOR STATISTICS.

Statistical Tables and Report on Trade Unions. Third Report. (Report by the Labour Correspondent of the Board of Trade.) London, 1889. Pp. 262.

Report on the Strikes and Lockouts of 1888. By the Labour Correspondent to the Board of Trade. London, 1889. Pp. 104.

Returns of Expenditure by Workingmen. (Commercial Department Board of Trade.) London, 1889. Pp. 49.

Returns of Rates of Wages in the Principal Textile Trades of the United Kingdom with report thereon. (Robert Giffen, Board of Trade.) London, 1889. Pp. xxxviii, 152.

Of the above four English parliamentary blue books, relating to labor statistics, the most novel to Americans is probably the one devoted to trade unions. There is no comprehensive report concerning the condition of trade unions made in the United States. Some of the separate state bureaus of labor statistics have collected information in regard to trade unions existing within particular states, but such an inquiry cannot be complete. I make the suggestion that this might be an interesting field of investigation for the National Department of Labor, although it must be confessed that as yet the trade unions in this country are not so important or powerful organizations as those existing in England.

The first report upon Trade Unions of England covered the year 1886,— the third one relating to 1888. The report is made by an official termed the Labor Correspondent, and submitted to the Assistant Secretary of the Commercial Department of the Board of Trade. It deals with the number of members belonging to trade unions; their contributions; the percentage of members who have enjoyed unemployed, sick, and superannuated benefits; and the amount per capita of membership paid for such benefits. There are also detailed tables relating to 104 different unions. The reports of some of these societies run back for a period of thirty or forty years,

thus furnishing a considerable mass of comparative material. There are two tables showing the chief causes of death in certain societies, with average ages at death, and the kinds of accident or diseases for which accident or disablement benefits are paid. In the Appendix there are extracts from the latest annual statements of various unions and a list of societies which sent no returns. Of these there are nearly 150. It is thought, however, that more than one-half the membership of trade unions is embraced in the report, the exact number being 373,904.

The income of 100 of these societies in 1888 amounted to £744,309, while the expenditure was £596,671. The total property on hand was valued at £707,583. The analysis of the expenditure accounts of some of the largest unions gives interesting results. The largest union is the Amalgamated Society of Engineers with a membership of 53,740. The following is a consolidation of the expense accounts:

Unemployed Benefits, ...	£54,740
Sick Benefits, ...	32,160
Superannuation Benefits, ...	38,343
Accident Benefits, ...	3,057
Benevolent Fund, ...	2,059
Funeral Fund, ...	9,381

At the same time it may be observed that of the total membership but 4.2 per cent received the unemployed benefit; 2.5 per cent the sick benefit; and 3 per cent the superannuation benefit. The highest percentage ever upon the unemployed list was 13.3 per cent in 1879.

Again, the Carpenters and Joiners in 29 years expended for the support of unemployed members £330,690; for sick members, £223,-843; for funerals, £40,828; for accidents, £23,720; and for superannuation, £22,003.

The per capita contributions in the several trades vary greatly. I have counted five in which this was more than £3 for the year. The foregoing memoranda indicate a few of the special lines of inquiry which might be made in this report. It is to be regretted that in neither this or in the other English reports on labor statistics are there combination statistical tables, connecting different questions of interest, such as are found in great abundance in the reports issued by the Massachusetts Bureau of Labor Statistics.

The first comprehensive statistical treatment of labor disputes or strikes in England was made under private investigation by Mr.

Bevan for the *Royal Statistical Journal* in a paper published in 1880. The inquiry covered the strikes occurring during the period 1870–79. It was not until 1888 that any public official attempt was made to collect information on this subject. This first attempt failed, as very few returns were made to the schedules which were distributed. The plan of collecting information was then changed. Intelligence in regard to strikes was sought for through the daily papers, and this time with more success. By this means 509 disputes in which stoppage of work occurred were noted in 1888. Although no absolutely definite judgment is possible, it is thought that strikes are somewhat less frequent than they were from ten to twenty years ago, and that those occurring are now readily brought to a conclusion. The following table shows the chief causes of dispute and the results of the strikes: —

Cause or Object.	Total Number.	Number Successful.	Number Partially Successful.	Number Unsuccessful.	Result not Known.
For advance in wages	320	175	76	48	21
Against reduction in wages	54	12	3	29	10
Dispute as to amount of recent advance	2	2	..	..	..
Dissatisfaction with conditions of work, hours, material, etc.	66	34	9	22	1
Dispute between classes of work people	2	2	..	..	..
Against alteration of working and residential arrangements	22	8	3	8	3
For introduction or defence of Union rules, etc	10	4	1	2	3
For reinstatement of certain men	6	3	2	1	..
Dissatisfaction with superior officials	15	8	..	5	2
Cause not known	12	1	..	1	10
Total	509	249	94	116	50

There is considerable descriptive material in this report, including a survey of English legislation upon the subject.

In the *Returns of Expenditure by Working Men*, an attempt is made to draw up "workingmen's budgets" much after the method of LePlay and Engels. The results of the inquiry, however, are not regarded as satisfactory. Of 730 forms sent out but 36, or about 5 per cent, were returned, and of these, two were not in a condition suitable for publication. The experience of this inquiry leads the author of the report to regard other budgets which have been pub-

lished as of dubious value. The Board of Trades are satisfied that the greater part of the budgets hitherto published, "most have been trimmed by the compilers, and the process, though perhaps excusable, raises many doubts as to the original basis of these budgets." No attempt at trimming, however, is made here, for the original budgets are published as obtained.

The incomes in the 34 budgets vary from £28, 12s. to £150 per annum. This extreme variation forces the observation that "these figures are enough to show that no exact annual budget could be drawn up without a good deal of trimming and cooking." As might be expected, there is little success in analyzing and comparing the returns according to Dr. Engels' law of expenditures.

In the introduction of the report upon *Wages in the textile trades*, Mr. Giffen points out that in nearly all statements of wages made in England, including the researches of Mr. Leone Levi and Mr. Dudley Baxter, the statistical view has been lacking, as there has been no attempt to correct the rates of wages with the proportionate numbers paid at each rate. It is on this point in particular that Mr. Giffen desires to furnish reliable data. The wages reported upon relate to one particular week in October, 1886, and cover about one-fourth of the total number engaged in the cotton, woollen, worsted, and linen industries. The following table gives a summary of wages: —

COMPARISON OF NORMAL WAGES IN THE COTTON, WOOLLEN, WORSTED, AND LINEN TRADES IN 1886.

ANNUAL.

	Cotton.	Woollen.	Worsted.	Linen.
	£ s.	£ s.	£ s.	£ s.
Men	65 12	60 0	60 13	51 13
Lads and Boys	24 4	22 0	16 18	16 4
Women	39 15	34 9	31 0	23 3
Girls	17 17	19 7	16 0	12 17

WEEKLY.

	s. d.	s. d.	s. d.	s. d.
Men	25 3	23 2	23 4	19 9
Lads and Boys	9 4	8 6	6 6	6 3
Women	15 3	13 3	11 11	8 11
Girls	6 10	7 5	6 2	4 11

The annual wages in the foregoing table are obtained by multiplying the wages of one week in October by 52. The possibility of unemployed time is touched upon, but is not regarded as a serious consideration. It is, however, doubtful if any wage statistics can be regarded as of much final value that do not weigh very accurately the loss of time throughout the year. The tables showing the distribution of wage earners according to rates of wages are of great interest. But a single reference can be made. Of 142,734 employed in the cotton trade, more than one-half, 81,240, receive wages above the average, 18,353 at the average, and about one-third, 43,141, below the average. The detailed statistics on this point are so abundant in this report that wage statistics can henceforth be treated far more intelligently than in the past.

DAVIS R. DEWEY.

MEMORANDA ON THE FALL IN RATES OF INTEREST.

In the following pages a few notes are offered on the fall in rates of interest which has taken place in this country in recent years. In order to determine its course and limits, in the spring of 1889 I deduced the net average rates of interest realized from 1869 to that date by twenty leading life insurance companies, viz., the Ætna, Connecticut Mutual and Travelers of Connecticut; Berkshire, Massachusetts Mutual, New England Mutual, and State Mutual of Massachusetts; Equitable, Germania, Home, Manhattan, Mutual, New York, United States, and Washington of New York; Mutual Benefit of New Jersey; National of Vermont; Northwestern Mutual of Wisconsin; and Penn Mutual, and Provident Life and Trust of Pennsylvania; and the result was published in the last or 46th Annual Report of the Directors of the New England Mutual Life Insurance Company, which I have the pleasure to serve as Actuary.

Since then I have similarly determined the rates of the same companies for 1889, an abstract of the complete results being stated in the following table: —

TABLE SHOWING THE HIGHEST AND LOWEST RATE REALIZED BY ANY COMPANY, AND THE AVERAGE RATE REALIZED BY ALL THE COMPANIES IN EACH YEAR, TOGETHER WITH THE QUINQUENNIAL AVERAGE OF THE LATTER.

Year.	Highest.	Lowest.	Average.	Quinquennial Average.
1869	8.2	3.9	6.0	....
1870	7.2	4.5	5.9	....
1871	7.2	4.9	6.1	6.1
1872	8.9	5.5	6.2	....
1873	8.3	5.6	6.5	....
1874	7.8	4.9	6.2	....
1875	8.4	5.6	6.5	....
1876	8.2	5.3	6.1	5.9
1877	7.7	4.8	5.6	....
1878	7.1	3.4	5.1	....
1879	6.7	3.8	5.0	....
1880	5.6	3.6	4.8	....
1881	6.3	3.8	4.8	5.0
1882	7.8	4.1	5.1	....
1883	6.8	4.1	5.1	....
1884	5.7	4.0	4.7	....
1885	6.0	1.9	4.7	....
1886	6.7	3.9	4.9	4.7
1887	5.6	3.9	4.7	....
1888	5.3	3.6	4.6	....
1889	5.6	3.7	4.6	4.6

I doubt if it would be possible to obtain more sufficient representative and reliable statistics upon the point in question.

Twenty companies could not have been selected which had enjoyed more uniform success during the whole period under observation. Their figures were taken as found in the sworn reports annually made to the insurance officials of the states of Massachusetts and New York. The assets of these companies on Dec. 31, 1868 and 1889, were: —

	Assets, 1868.	Assets, 1889.
Real Estate,	$4,424,662	$70,940,544
Mortgages,	49,337,226	252,342,743
Government Securities,	19,387,876	240,804,267
State, County, and Town Securities,	10,180,318	
Bank Securities,	1,716,666	
Railroad Securities,	1,361,308	
Collateral Securities,	1,799,604	33,805,525
Premium Notes Securities,	31,303,294	12,341,660
Cash and other items,	14,671,518	50,377,886
Total,	$134,182,472	$660,612,625

They thus covered a considerable fraction of the safe investment securities of the country, divided in somewhat equal proportion to the total amount of each between the several leading sorts.

It would be invidious to quote specifically the figures of individual companies here, and I shall not do so; but it may be said that they all exhibit about the same course as respects decline in rates. Thus the quinquennial average rates of the company which appeared to have enjoyed the highest general average rate for the whole period were for 1869–73, 6.9; 1874–78, 7.6; 1879–83, 5.8; 1884–88, 5.5; and 1889, 5.6 per cent. The high average for the years 1874–78 was due to fortuitous circumstances, as the great drop to the succeeding quinquennial rate shows.

The general conclusion of this study is that the decline in rates began with 1876 and nearly ceased with 1884, since which time a pretty constant low rate has prevailed. The rates for the last two years are by .1 per cent the lowest of the whole period, and it may be safely assumed that whatever changes may occur in future these may be taken as about the maximum rates which there is any reason to expect in times of commercial quiet.

It is proper to state that in determining all the rates given in these notes I have taken the cost of investment at .5 per cent, which must be added to my figures in any case to show the gross rate.

WALTER C. WRIGHT.

May 7, 1890.

ELECTION STATISTICS OF MASSACHUSETTS.

The statutes of Massachusetts provide that on May 1st of each year every male twenty years old and upwards shall be assessed a poll tax, and this provision applies to unnaturalized males as well as citizens. In order to vote a man must be twenty-one years of age, be able to read and write, must have paid a poll tax within two years, and must have his name on the list of registered voters for the precinct wherein he casts his vote, and in which he lived on the first day of May of the year in which the election takes place.

From the returns of the polls in the various cities and towns made to the Secretary of State in May, 1889, and the return of the number

of registered voters and votes cast in each precinct at the State election Nov. 5, 1889, as shown by a statement made on March 12, 1890, by the Secretary of State to the House of Representatives, and printed as House Document No. 218 of 1890, the following figures are drawn: —

Counties.	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes to Registered Voters.	Per cent of Votes to Polls.
Barnstable...	8,406	6,910	3,014	82.2	43.5	35.7
Berkshire....	21,075	14,828	11,397	70.3	76.8	54.0
Bristol.....	43,813	25,416	16,787	58.0	66.0	38.3
Dukes.....	1,267	1,081	530	85.3	49.0	41.8
Essex.....	76,715	50,990	37,927	66.4	74.3	49.3
Franklin.....	10,577	8,354	5,610	79.0	67.1	53.0
Hampden	32,545	20,820	15,627	63.9	75.0	47.9
Hampshire...	11,958	9,342	6,589	78.1	70.4	55.0
Middlesex....	107,348	70,409	53,714	65.6	76.6	50.2
Nantucket....	888	866	602	97.6	69.5	67.8
Norfolk.....	29,872	21,935	15,912	73.4	72.5	53.2
Plymouth....	24,742	18,410	11,399	74.0	61.8	45.7
Suffolk.....	130,032	73,854	58,697	56.7	79.4	45.0
Worcester....	74,483	48,827	36,067	65.5	73.8	48.3
Whole State..	573,721	372,042	273,872	64.8	73.6	47.7

Separating the cities from the towns we have

	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes to Registered Voters.	Per cent of Votes to Polls.
Cities.....	342,725	212,274	159,080	61.9	74.9	46.4
Towns.....	230,996	159,768	114,792	69.1	71.8	49.6

And taking each county by itself,

Counties.	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes Cast to Registered Voters.	Per cent of Votes Cast to Polls.
BARNSTABLE:						
Towns.....	8,406	6,910	3,014	82.2	43.5	35.7
BERKSHIRE:						
Cities.....	4,784	3,380	2,730	70.6	80.7	57.0
Towns.....	16,291	11,448	8,667	70.3	75.7	53.2
BRISTOL:						
Cities.....	32,174	16,837	12,226	55.7	72.6	40.4
Towns.....	11,639	8,579	4,521	73.7	52.7	38.8
DUKES:						
Towns.....	1,267	1,081	530	85.3	49.0	41.8
ESSEX:						
Cities.....	50,368	31,129	24,099	61.8	77.4	47.8
Towns.....	26,347	19,861	13,828	75.3	69.6	52.4
FRANKLIN:						
Towns.....	10,577	8,354	5,610	79.0	67.1	53.0
HAMPDEN:						
Cities.....	19,015	11,477	9,155	59.7	79.7	47.6
Towns.....	13,530	9,343	6,472	69.0	69.2	43.7
HAMPSHIRE:						
Cities.....	2,995	2,229	1,769	74.4	79.3	59.3
Towns.....	8,963	7,113	4,820	79.3	67.7	53.7
MIDDLESEX:						
Cities.....	65,277	39,950	32,073	61.2	80.2	49.1
Towns.....	42,071	30,430	21,641	72.1	71.0	51.2
NANTUCKET:						
Towns.....	888	866	602	97.6	69.5	67.9
NORFOLK:						
Cities.....	4,096	2,868	2,106	65.1	78.9	51.3
Towns.....	25,776	19,267	13,806	74.7	71.6	53.5
PLYMOUTH:						
Cities.....	7,115	4,696	3,408	66.0	72.6	47.9
Towns.....	17,627	13,714	7,991	77.8	58.1	45.2
SUFFOLK:						
Cities.....	128,075	72,509	57,798	56.6	79.7	45.1
Towns.....	1,957	1,325	899	67.7	66.9	45.3
WORCESTER:						
Cities.....	28,826	17,339	13,656	60.1	78.7	47.3
Towns.....	45,657	31,488	22,411	68.9	71.1	49.0

These figures show that in every county a larger percentage of the registered vote was cast in the cities than in the towns, while the ratio of the registered voters to the number of polls is in every county smaller in the cities than in the towns.

In the ten counties containing cities as well as towns the ratio

between the number of polls and the votes cast was in five of them larger in the cities and in five larger in the towns. In regard to the vote cast it must be recalled that 1889 was politically an "off year," and that the Australian ballot system was used in Massachusetts for the first time at that election.

There are two counties in which the distinction between urban and rural communities can be more sharply drawn than in any other; these are Middlesex and Worcester. By urban communities is to be understood in addition to the cities those towns whose interests are almost entirely manufacturing, and which have by far the greater number of inhabitants living in one or more compactly built villages within the limits of the town. Taking the figures for those two counties we have:

Counties.	Number of Polls.	Number of Registered Voters.	Number of Votes Cast.	Per cent of Registered Voters to Polls.	Per cent of Votes Cast to Registered Voters.	Per cent of Votes Cast to Polls.
MIDDLESEX:						
Urban.....	77,806	49,377	39,008	63.4	79.0	50.1
Rural.....	29,542	21,032	14,706	71.2	69.9	49.7
WORCESTER:						
Urban.....	51,990	33,021	25,355	63.5	76.7	48.7
Rural.....	22,493	15,806	10,692	70.2	67.6	47.3

To judge from the state census of 1885 this return of polls is too low throughout the state in general, so that if we take the ratio given in that census between polls and legal voters, we shall have as the total number of legal voters in the state a number less than the actual number. If, however, we assume that ratio to hold good, we get for the state as the total number of legal voters 447,100, and the percentage of the registered voters to the legal voters will be 83.2, and the ratio of the vote cast to legal voters 61.2 per cent; in other words, about 17 per cent of the voters of the state are not on the voting lists, and as may be seen from the first table over 26 per cent of those on the list fail to vote, so that nearly 39 per cent of the legal voters of Massachusetts failed to cast a vote for one reason or another. A consideration of the tables will show that the uncast vote is to be found, in a large measure, among the rural towns, and this vote is much of it brought out by the excitement of a national campaign. Whether the fact

that the tariff was made an issue in the state campaign of 1889 is in any degree responsible for the low percentages of votes cast in the eastern counties of the state, Barnstable, Bristol, and Plymouth, it is impossible to say. Similar returns do not exist for previous years as far as I know, so that no comparison can be made between years like 1889, when only state officers were elected, and years in which congressmen and presidential electors were chosen.

WALTER S. ALLEN.

FRENCH STATISTICAL ALBUM.

Album de Statistique Graphique de 1888. Ministère des travaux publics. Paris. 1889. Pp. x. Plates 22.

This is the tenth issue of the statistical album issued by the Ministry of Public Works of France. These albums have for their special end the graphical representation of statistics of railroads, internal and ocean commerce, and passenger transportation in Paris. Eight charts are devoted to the first subject, eleven to the second, and three to the last. Under railroads, for example, there are graphical charts illustrating gross and net receipts, number of passengers carried, tonnage, consumption of rails, development of railroads in the principal countries of the world from 1830 to 1880; and two very ingenious plates showing the shortening of time for various distances of travel in France during the past two hundred years, and the decrease in passenger rates of fare since 1798.

There are three principal methods employed in representing the statistics, based in almost all instances upon cartograms. These methods are: First, the use of lines on bands of different widths, to represent, for example, the gross and net receipts of railroads, the bands following upon the map the routes of the principal railroad systems; second, the use of circles, to show, for example, the gross receipts at railway stations. The circle is divided into as many sectors as there are roads running into the stations. Each railroad is represented by a conventional color, a light shade of this indicating the passenger receipts, and a dark shade the receipts from merchandise. A third method is the use of squares divided in much the same way as the circles.

The map, which shows the shortening in time of journeys to different parts of France, in the past two hundred years, is constructed on an ingenious plan. A large map of France indicates by proportional distances the length of journeys in time to different towns from Paris, by the diligence in 1650. Other maps of France are drawn within the first with Paris as a common centre, each representing a different epoch in the history of transportation; the radii from Paris to the several towns are constructed according to the same scale, depending upon the time spent. Thus we have a series of concentric maps growing smaller and smaller. To Havre the successive radii measured in hours are as follows: In 1650, 97; 1782, 52; 1814, 31; 1834, 17; 1854, 5.15; 1887, 4.10. Much improvement was evidently made before the introduction of railroads.

D. R. D.

MINOR NOTICES.

The first number of the *Annals of the American Academy of Political and Social Science* (July, 1890) which has just appeared contains matter of interest to students in the various departments of the broad field which the journal expects to occupy. A translation by Miss Jane E. Wetherill, of the official report of the Hungarian Minister of Commerce, upon the zone tariff in Hungary, as applied to railroad passenger rates, gives a very complete statement of the practical operation of this novel system of passenger fares. It is full of figures bearing on the subject, with an instructive comparison of the workings of the former and present systems. The influence of the price of tickets upon the amount of railroad traffic is clearly brought out. The most salient points of the report are summarized in an introductory note by Prof. E. J. James, which gives some interesting figures comparing the relative amount of the passenger traffic of railroads in different countries. It shows that the passenger traffic of American roads has received very little attention from railway managers, and that, despite the great fall in freight rates in the last thirty years, passenger fares are little less than they used to be. The article is an important contribution to the literature of transportation problems. Mr. Leo S. Rowe gives a statement of the "Instruction in Political Economy and Public Law in German Universities," a list of all

lectures delivered in the winter semester 1889–90. Preceding the list the writer has presented the main facts in tabular form, showing the number of instructors, and the hours per week given in the more important topics. By this means one may readily compare the relative strength in these departments of the various universities in the list. A comparison with American institutions would, if practicable, have lent an additional value to the article. Other leading articles of the number are "The United States and Canada," by Dr. Bourinot; "The Decay of Local and State Government," by Prof. Patten; "Wages and Interest," by Prof. Clark; and "The Province of Sociology," by Prof. Giddings. There are the usual book notices, together with other miscellaneous matter. The periodical publishes the proceedings of the Academy, and will appear quarterly. The editors are E. J. James, F. H. Giddings, and R. P. Falkner.

The prospectus of a new periodical, *Allgemeines Statistisches Archiv*, published by Laupp, in Tübingen, has been received. It will appear semi-annually under the editorship of the well-known Dr. Georg von Mayr. There is at present no periodical in Germany devoted especially to what they know as literary statistics, by which is meant the non-official work in the field, more especially the discussion of general theories and the interpretation of official results. This is the field which the new enterprise proposes to occupy. It will offer an opportunity for the publication of essays bearing on the general theory of statistics, and its relations to other forms of knowledge, besides more technical discussions of the methods to be employed in statistical work. The main feature of the work is, however, to be an attempt to popularize the results of official investigations. With the least possible use of the extensive tables which deter from the use of official documents, it is hoped to present the substance, the main relations, and the principal points of view of such publications in the form of readable essays. By such means an effort will be made to bring the work of statisticians within the reach of general readers. Such an experiment must attract attention. The first number for 1890 is promised in the course of the summer.

Atlas of Commercial Geography, illustrating the general facts of physical, political, economic, and statistical geography on which international commerce depends. By John George Bartholomew. With introductory notes, by Hugh Robert Mill. Cambridge University Press. 1889. Pp. viii. Maps 27.

The introduction states that the contents have been arranged mainly with a view to educational utility. The general maps, constructed either on Mercator's projection or on Gall's stereographic projection, show heights and depths, ocean currents, mean annual rain fall, prevailing winds, condition of climate, distribution of mineral, vegetable, and animal commodities, diseases, density of population, chief races of man, religions, isochromic distances, postal systems of the world. Special maps are also given devoted to separate countries. Although the maps are not novel in conception, it is rarely that so large a number of suggestive interest are brought together in so convenient a form.

Fourth Annual Report of the Factory Inspectors of the State of New York. January, 1890. Albany. Pp. 329.

Some conclusions are offered in regard to the operation of the recent law for restricting the hours of labors; and there is the usual discussion concerning the employment of children, railways and elevators, fire escapes, etc. The total number of accidents in manufacturing establishments was 647 against 630 for the preceding year. 56 were fatal. The proceedings of the third annual convention of the Internal Association of Factory Inspectors of North America, August 6–9, 1890, is included.

In a paper upon the *Restriction and Prevention of the Dangerous Communicable Diseases*, by Henry B. Baker, M.D., Secretary of the State Board of Health of Michigan, there were several interesting and valuable statistical tables upon "Life Saving" in Michigan. The conclusion is that the record shows a saving of over one hundred lives per year from small-pox, four hundred lives per year saved from death by scarlet fever, and nearly six hundred lives per year saved from death by diphtheria,—an aggregate of eleven hundred lives per year, or three lives per day saved from these three diseases. The article is illustrated by diagrams.

Annali di Statistica. Saggio di Bibliografia Statistica Italiana. Terza Edizione Accresciuta. Ministero di Aguicoltura, Industria, e Commercio. Rome, 1890. Pp. xix, 213.

The first edition of this bibliography of Italian statistical literature was published in 1883, with an introduction by Dr. L. Bodio. The introduction is reprinted in this, the third edition. The bibliography is arranged by topics, and testifies to the diligence and wide range displayed in statistical inquiries by Italian students and their government.

Fifth Annual Report of the Board of Gas and Electric Light Commissioners of Massachusetts. January, 1890. Boston. Pp. 207.

The attention of students of municipal administration may well be directed to the reports of the Gas and Electric Light Commissioners of Massachusetts. No other American state publishes such reports, and even the returns made by the English gas companies to the Board of Trade, and published among the parliamentary papers, are very meagre as compared with these. The distinguishing part of this particular issue is the article on water gas. The returns from electric light companies are also much fuller than ever before. Incidentally the Board has collected and published a record in regard to the deaths in 1889 of 107 persons throughout the United States from inhaling illuminating gas. The statistical records are very full, furnishing comparative data concerning 75 gas companies and 100 electric light and power companies. The data cover such points as capital, number of stockholders, stockholders resident in Massachusetts, receipts, expenses, dividends, price of gas, etc.

Second Report on the Custody and Condition of the Public Records of Parishes, Towns, and Counties. By Robert T. Swan, Commissioner. Boston, 1890. Pp. 45.

The first Report issued in 1889 was briefly noticed in Number 7. The second contains the record of the work of but five months, much of which is of a preliminary character. Further inquiry has been made in regard to the keeping of town records. Thirty-two towns are reported as having either a worthless or no safe whatever, and fifty-two as not having sufficient safe room for all records and papers. The records of assessors and collectors are most neglected. There is an interesting discussion as to the merits of the type-writer for copying and preserving records. The verdict on the whole seems to be favorable.

Third (1889) Annual Report of the Board of Mediation and Arbitration of the State of New York. Albany, 1890. Pp. xii, 437.

Special Report on the New York and Brooklyn Surface Railroad Strike. Pp. 188.

This contains a statement of the most important labor disputes from Nov. 1, 1888, to Oct. 31, 1889. It is stated that there was a marked diminution in strikes and lockouts in 1889, and that there is a growing acceptance of arbitration as a method of settlement. The report would be more helpful if there was a detailed index, or if the material were summarized in some particulars in a tabular form.

MISCELLANY.

STUDY OF STATISTICS IN COLLEGES.

The following paragraphs are taken from an article on *The Study of Statistics in Colleges and Technical Schools*, by President Francis A. Walker, published in the *Technology Quarterly* (Boston), Feb., 1890.

* * * * *

The three uses of statistical study, aside from its value as a means of discipline, are, in their order from lowest to highest, as follows: —

First, to enable the student to detect the fallacies in conclusions drawn by others from quantitative statements concerning human affairs, actions, interests, in which adventitious elements lie concealed, or from which something essential, or at least relevant, has by inadvertence or dishonest design been excluded.

Secondly, to enable the writer or the speaker upon politics, economics, history, or sociology safely and effectively to illustrate and emphasize his conclusions, drawn from a study, itself perhaps mainly or wholly non-statistical, of the subject to which he devotes himself.

Thirdly, statistics may, under proper direction and with due safeguards, be used for the discovery of social laws.

The first of these objects could perhaps only be fully attained through those long and weary stages of training which would be required to qualify one for the highest exercise of the statistical faculty, as last stated; but a very large part, at least, of the result desired can be reached by a little very elementary instruction. To take an illustration from another department of study, we may suppose that an adequate course in logic, sufficient to make a man, otherwise well trained, a sound and accomplished reasoner, might be compassed in a certain number of exercises per week, continued through two academic years. Yet, if time be not afforded for such a course, a great deal might be done to enable the student to detect false conclusions on the part of others, and to save him from the grosser errors of reasoning in his own writing or speaking, by means of a dozen hours devoted to fallacies. In much the same way, if a full course in statistics cannot be given, a few exercises upon the abuses of statistics may at least serve to keep one for life from a certain class of blunders from which men of the greatest acuteness and learning might not otherwise be exempt.

Let us take an illustration of the sort of errors against which the merest elementary study of statistics might prove a sufficient protection. A meritorious writer adduces as a proof of the great fall of prices which took place in New England between 1630 and 1640

that a cow which, at the former date, was worth £25 to £30 would, at the latter date, have brought but £5 to £6. Now, the bare facts here are not in dispute; nor is it to be questioned that a fall, a great fall, in prices did take place in New England during the period referred to. Yet the statement quoted contains a gigantic blunder,—a blunder which a student of statistics would probably be incapable of making. In 1630 the value of a cow in New England represented the immense cost and risk of bringing an animal, by a slow-sailing vessel, thousands of miles, through comparatively strange seas, into a foreign climate. Ten years later, the value of a cow represented only the cost and risk of rearing her upon the soil. The cow of 1630 might still be living, surrounded by ten, twenty, or fifty of her descendants, born in New England.

Errors of this type are countless. They occur in the writings, they are heard in the speeches, of men learned and otherwise acute, but who have never been trained to detect the fallacies that lurk so cunningly under all groups of figures. Volumes might be filled with instances of statistical blunders of a class which a very elementary course would forever render impossible to any careful writer or speaker. Such a course would embrace a host of illustrations, affording examples of the kinds of error which especially beset the use of figures for sociological purposes, and would direct the attention of the student to the best means of exercising care and pains in escaping them.

It is easy to say that, if statistics be in truth such "kittle cattle," if danger lurk thus under every group of figures relating to social and economic matters, it would be better to eschew statistics entirely. But mankind will not consent to give up an agent of such power, because of the abuses to which it is subject. If all men at once honest and candid were to forbear to employ statistics in such discussions, lest peradventure they should lead some astray, we may be sure that all the dishonest and uncandid would resort to their tables and diagrams with redoubled zeal. There are few instincts more strong than that which urges men to give a quantitative expression to the results of human experience. Men will do it, or have it done for them by others. No warning as to the possible errors of such evidence can prevent this appeal, or diminish the eagerness with which it will be made. What we must needs do, if we will promote the truth, is to instruct and exercise the citizen, as far as we may, in the scrutinizing, sifting, and testing of alleged statistical proofs.

* * * * *

We cannot all be Cobdens, Gladstones, or Wellses; but every educated man can learn to construct tables and diagrams which will bear the test of a fair scrutiny and liberal criticism. To do aught in the way of statistics at which fools will not peck is of course beyond any man's power.

Those who have never tried their hand at statistical work will fail to appreciate the difficulties to be encountered at the start, and the frequently recurring need of going back and beginning all over again. To go to a series of extended tables with multitudinous subdivisions, in which a given total is distributed among many classes, and to take therefrom just what you want, no more, no less, and no other,—to make sure that your parts when put together will form a whole, and that no direction conveyed by the heading of a single column has been neglected,—is a task for which men must be trained, and in which they must be practised, going from simple and easy examples to complex and difficult ones by patient steps. The great majority of editors and writers for the press, the great majority of legislators and public speakers, either fail on such work, or, as is most likely, judiciously avoid the attempt, even though statistical matter altogether relevant to the subject, and which might be made most interesting to their readers or hearers, lies on every side of them. In my long experience in office at Washington, nothing struck me more forcibly than the helplessness of Congressmen—even, with few exceptions, the acutest and best trained—to get up the figures for their own speeches. No matter how clear their conception of the positions they wished to present, few of them could readily and confidentially resort to the government publications at hand for the statistical materials with which to illustrate and enforce their views; and the gratitude with which they would accept and acknowledge some trifling assistance from a well trained clerk was almost ludicrous. I do not intend any disparagement by this statement. Statistics have a language of their own, and he who would use them must first learn that language; and this is as yet taught scarcely anywhere.

A striking example of the liability to mistakes which constantly besets the compilation of statistical tables was afforded in a book published, some years ago, under the title, "The Statistics of the United States." The plan of the work was a good one; such a book was needed; but the author evidently had not had the training requisite safely to carry out his scheme without falling into the gravest errors. For instance, the work undertook to present the expenditures of the United States for each year since the formation of the government. The figures used were taken directly from the finance reports of the Treasury Department, and were hence of the highest official authority. Unfortunately, however, the compiler went for this purpose to the column of "Gross Expenditures," and transferred the figures he found there into his table. The result was that for some years he was out of the way by several hundreds of millions of dollars, since during these years the Treasury issued large loans to pay off other loans contracted during the war at high rates of interest. Thus, for 1868 this writer gave the expenditures of the government as $1,093,079,655,—a very expensive government indeed for a time of profound peace! The facts were as follows. The "net ordinary expenditures" of

the government that year were $202,947,734; there was paid from the Treasury, in bond premiums, $10,813,349; and, as interest on the national debt, $143,781,592; making the total expenditures of the government on these accounts, $357,542,675. In addition, the Treasury redeemed bonds to the amount of $735,536,980; and this, mainly, out of the proceeds of fresh loans, at lower rates of interest. All this vast sum, more than twice the actual expenditures of the government, even after including bond premiums and the current interest on the public debt, was embraced in the financial statement of the last year of Mr. Johnson's administration. This mistake was committed in connection with each successive administration, from Washington's down.

It is needless to say that blunders of such a magnitude completely destroyed the prestige of the book; and that, although it was intended to be issued from time to time, with the facts and figures brought down to date, it was never heard of again.

Another example of statistics rendered actually delusive by the neglect of elementary considerations is found in a recent work on State and Municipal Taxation, a book which, in many of its views and suggestions, makes a valuable contribution to economic literature, but is, statistically, very faulty. Thus, in a "comparative table," showing the "principal receipts, total receipts, and total expenditures" of certain leading cities, New York is put down for $73,309,884 of total receipts, in 1886, and for $71,750,743 of total expenditures. Now the fact is that nearly twenty millions alike of the receipts and of the expenditures represent nothing but temporary loans, contracted and paid during the year. City taxes come in mainly during a brief period. In order to prevent the necessity of keeping a vast sum of money in the treasury for months together, the government properly borrows in the "dry season," and liquidates its obligations when the taxes set in like a flood. Yet this fact was, in the work referred to, allowed to swell the expenditures of the city more than one third. Had the city treasurer found it expedient to borrow ten millions more for one, two, or three months, this would have carried the "expenditures" of New York up to eighty-one millions!

THE FIRE LOSSES IN THE UNITED STATES DURING 1889.

HOW DISTRIBUTED BY STATES AND SECTIONS, CAUSES AND DIVISIONS OF THE YEAR.

The following is an abstract of the review of the fire losses in the United States during 1889, appearing in *The Chronicle Fire Tables:*

The destruction of property by fire in the United States in 1889 was greater than in any other year since the great fires in Chicago and Boston.

The number of noteworthy fires in the United States in 1889, not

including the smaller ignitions with merely nominal losses, was 17,598, an increase of 1,579 fires over 1888. The value of the property destroyed by these fires was 123.0 millions against 110.9 millions in 1888, an increase of 12.1 millions. The average property loss per fire was $6,992. In preceding years the average losses per fire were as follows: in 1888, $6,922; 1887, $7,330; 1886, $6,760; 1885, $7,285.

The geographical distribution of the fire waste in 1889, compared with 1888, was about as follows: in the New England States 16.8 millions against 12.9 millions in 1888; in the Middle States 27.4 millions against 33.1 millions in 1888; in the Southern States 18.8 millions against 16.5 millions in 1888; in the Western States 35.8 millions against 35.8 millions in 1888; in the Pacific States and Territories 24.2 millions against 12.9 millions in 1888. It will be seen that the fire loss in the New England States in 1889 was considerably heavier than in the preceding year, while in the Middle States the loss was much lighter than during the year before. In the Southern States there was a moderate increase, while in the Western States the sum destroyed was almost exactly equal to the destruction by fire during 1888. Excessive losses occurred in the Pacific States and Territories, the destruction in this section having been about twice as great as in the preceding year, chiefly owing to the sweeping fires in the new State of Washington.

The loss in the first quarter of 1889 was 27.3 millions against 34.4 millions in the first quarter of 1888; in the second quarter 33.1 millions against 26.7 millions in 1888: in the third quarter 28.6 millions against 26.5 millions in 1888; in the fourth quarter 34.0 millions against 23.4 millions in 1888. Therefore, the largest loss in 1889, l y divisions of the year. was in the fourth quarter, whereas in 1888 the largest loss was in the first quarter of the year. The statistics of fifteen years show that the highest average losses occur in the first and fourth quarters.

The loss in 1889 on property in which fires originated was 72.7 millions against 78.9 millions in 1888. The loss by exposure in 1889 was 50.4 millions against 31.9 millions in 1888, showing a large increase, attributable, of course, to the numerous sweeping fires. The causes of 8,490 fires were fairly well known, but the causes of the remaining 9,108 were either not reported at all or stated to be unknown.

Owing to the incompleteness of the reports, the study of fire causes is very unsatisfactory. No particular effort is made by the public authorities to ascertain the actual causes of fires, taking the country as a whole. In some of the larger cities there are municipal officers whose duty it is to investigate the origins of fires, but their labors, however conscientiously performed, contribute very little toward the enlightenment of the people with regard to the causes of fires in the country at large. Even the officers of fire insurance companies and

of fire underwriters' organizations are sometimes very reluctant to assign causes for fires which come under their notice.

We have shown that the average loss per fire last year was $6.992, which is another way of saying that the community lost that amount of money about every time a fire occurred. The average loss varies but little year by year, consequently every genuine alarm of fire during the current year will mean an absolute loss to the people of the United States of about seven thousand dollars. Undoubtedly the time will come when the county or city authorities will be compelled by law to investigate the causes of fires or special officers appointed to give their entire attention to this purpose. When that time arrives the causes of the tremendous destruction by fire which is continually going on will be much better understood, and probably a very large proportion of the present fire waste will be prevented. No one can reasonably expect that anything will be accomplished in the way of fire prevention until the causes of fires and of the heavy losses thereby are better known. Meantime it is fortunate that the productive power of the people is so vast that 123 millions of accumulated wealth can be wiped out of existence in a single year without surprise or protest, and it is high testimony to the perfection of the insurance system that these mammoth losses are so evenly distributed that they fall lightly on the many instead of onerously on the few.

How little is really known of the origins of fires is rendered evident by the fact that of the 123 millions consumed last year we have but a partial idea of how 79.7 millions came to be destroyed, after counting in the great loss (over fifty millions) through exposure. Of the 72.7 million dollars' worth of property destroyed by fires originating on the premises, specific causes can be assigned for the loss of only 29.4 millions, leaving a property value of 43.3 millions which was swept away by fires that started in some unknown manner.

The principal known causes of fires are as follows in order of rank: incendiarism, defective flues, sparks (miscellaneous and locomotive), matches, lamp explosions, stoves, spontaneous combustion, lightning, lamp and lantern accidents, gas jets, forest and prairie fires. These eleven causes were responsible for 6,223 fires, or 73 per cent of the whole number of fires of known origins. The remaining 2,267 fires of known origins were divided among forty-seven lesser causes.

Nearly twenty-three per cent of the fires of known origins were reported as incendiary. The proportion of incendiary fires in 1888 was about twenty per cent; in 1887 about twenty-one per cent; and in 1886 about twenty-six per cent. In Tennessee, West Virginia, and Wyoming more than one-half the fires were said to be of incendiary origin. In eighteen other states, viz., Connecticut, Delaware, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Arkansas, Louisiana, Texas, Indiana, Iowa, Nebraska, Kansas, Idaho, and Washington, the causes of thirty-five to fifty per cent of the fires were similarly reported.

One of the interesting features of the fire loss in 1889 is the falling off in the number of fires attributed to defective flues. Perhaps the remarkably mild weather of the past winter explains this phenomenon. During the winter months defective flue fires are of frequent occurrence, especially in the coldest weather. In an unusually mild winter — such, for example, as the winter of 1889–90 — the defective flue hazard is probably considerably lessened.

At this moment there are no causes of fires which are being more closely studied than electric wires and lights. Within four years the value of the property annually destroyed by electric wires and lights has risen from less than one-half million dollars to more than five and one-half million dollars. During the year 1889 electric wires were charged with their first great conflagration, viz., the Kingston Street fire in Boston, Mass., on November 28, 1889.

In the fifteen years during which *The Chronicle* has kept its careful record of fires *one thousand three hundred and sixty-five million dollars'* worth of property has been destroyed by fire in the United States. The magnitude of this sum is almost beyond comprehension. Through the system of fire insurance the people have taxed themselves to relieve the misfortunes of the direct sufferers, and have repaid to the latter in this manner nearly *seven hundred and sixty-nine million dollars.* The loss of the remaining five hundred and ninety-six millions was borne by those whose property went up in smoke without succor of any kind. How many hundreds of these millions were destroyed by criminal fires, how many hundreds of millions by a carelessness that was akin to criminality, how many hundreds of millions by a careless and ignorant construction cannot be precisely stated. Most fire underwriters would probably consider an estimate that one-fifth of this great property loss in fifteen years, or about two hundred and seventy-five million dollars, was caused by incendiarism and arson, as far below the fact. Yet, on the basis of the apparent percentage of incendiarism in 1889, much more than two hundred and seventy-five million dollars of property values were consumed in the United States within a period of fifteen years by the torch of the incendiary.

NEW FRENCH MORTALITY TABLES.

In the Economic Section of the "World's Fair," held at Paris last year, were exhibited two important tables of mortality. These are the joint production of the four French companies, Assurances Générales, Union, Notionale, and Phénix. The preparation of these tables must be regarded as an event of great importance in the history of vital statistics. We are not aware that anything on the same scale has ever before been attempted in France, and offer our sincere congratulations to the life assurance world across the channel on this their recent achievement. The tables are two in number. The first

of them represents the mortality which has been experienced among the annuitants of seven companies, namely, the Caisse Paternelle, Urbaine and Monde, and the four companies which have been associated in the preparation of these statistics. To designate this table, the symbol R F (Rentiers Français) is employed. The observations embrace the experience of the seven companies from 1819 to 1878 (should this be 1888 ?), and it will be useful to set before our readers a few figures for the purpose of comparing the extent of the observations with those on which Mr. Finlaison's government annuity tables of 1883 are based. The total number of lives under observation is 40,328, of whom 16,927 are men and 23,401 women. The men have supplied 149,377 years of life and the women 227,370. Mr. Finlaison's tables relate to 10,929 men and 19,859 women, so that in France the proportion of male to female annuitants is decidedly greater than in England; at any rate, if the comparison of the R F with the government table of 1883 is a fair one. In the English table the number of years of life is decidedly greater in proportion to the number of lives observed. The second table relates to the lives assured in the four associated companies under policies written between the years 1819 and 1888, and a comparison is instituted between this experience and that of the institute of actuaries' experience, healthy males and females combined. This second table is denoted by A F (Assurés Français). 229.143 lives are included in the observation of the A F table, being about fifty per cent in excess of the lives included in the institute of Actuaries Hmf. Of the French lives about one-quarter are women. With the assured lives, as with the annuitants above referred to, we find that the average duration of the observation per life is decidedly greater in the English table than in the French. While in the French table of assured lives the total number of years of life is 1.790,783, as compared with 1,350,762 in the English table; yet, on the other hand, the deaths in the French table — namely, 22,621 — are 1,235 less than in the English table. This is a somewhat curious result, and perhaps has its origin in the fact that in France the average age at entry is less than in England.

We are informed in a short preface to the pamphlet containing the tables that the rates of mortality have been obtained by a double adjustment after Woolhouse's method. These researches, conducted under the auspices of the four French companies into the mortality prevailing among the French annuitants and assured lives, are not complete. In the present publication we have merely given the rates of mortality of the lives taken as a whole, and in the table of annuitants there is no separation of male and female lives. On completion of the work now in progress, having for its object the determination of the mortality, as affected by the duration of the contracts, the complete results will be published, together with a detailed description of the methods on which the investigation has been conducted. These tables will, no doubt, prove of great interest for the life assurance world, and their publication will be eagerly awaited by British actuaries.—*The Insurance Record*, London.